

1061574405

1  
SEQUENCE LISTING

1061574405 31 MAR 2000

<110> Gazit , Ehud  
Cherny, Izhack

<120> NOVEL ANTIBACTERIAL AGENTS AND METHODS OF IDENTIFYING AND  
UTILIZING SAME

<130> 31689

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<170> PatentIn version 3.2

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agtttagaag atttcgcagc ttacgaagaa acggcttatt tattacgcag ccccaaaaat 180  
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gcagaagagt ttgaacgcta ccaggcggcc agaatggatg atgagttcgc ggctatcatg	180	
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 <211> 234  
 <212> DNA  
 <213> *Rickettsia conorii*

<400> 45  
 acactagaat cagcggagga tttagcgtat tggaaaaat acgatattaa aaaatatgaa 60  
 cgtattaaac ttctaataaa aaatatccaa gaagcaccgg ttacaggtat aggttaagccc 120  
 gaacctttaa aacatatatt atcaggtta tggtcacgta gaattaacca cgaacataga 180  
 ctaatatatt ctgtcaatac taaacaaatt ataatatata attgttagctt tcat 234

<210> 46  
 <211> 228  
 <212> DNA  
 <213> *Salmonella typhi*

<400> 46  
 atgtttatgc gtacggtaa ctatagcgaa gcgcggcaaa atctggccga agtcctggaa 60  
 agtgcgtga cgggggggccc ttttaccatc acgcgtcgtg ggcataagtc cgcagtgtatc 120  
 atcagcggccg aggagtttga gcgttatcag acggcgcgaa tggatgatga gtttgctgccc 180  
 attatggcgg ttcatggcaa tgagctcagg gagctggcgg ataaatgaa 228

<210> 47  
 <211> 369  
 <212> DNA  
 <213> *Salmonella typhi*

<400> 47  
 atgaccctac aacttatctc agcggaaagag ataattcagt ttcacgacag gcttctccgc 60  
 gttacgcctg gtgttaacagg catgcctgat cctggccgca gggaaacgcgt aatgtaccgg 120  
 gtactcaagc aaatcgaata tgaagggtg accgacgtgt ggctgctggc ggcaatgcat 180  
 ttgctcgcta tatcccggtt gcatatcttc aatgatggta acaaacgtac cgccttattt 240  
 attacgcgtc tttttttaaa gctgtacggg atctcactcg ctgcgaatcc ggatttgtc 300  
 gatatgacag tcgatgcggc ggcaggcgg cttacgctgg agcaaattgc cgttcgcctta 360  
 cgtgcctga 369

<210> 48  
 <211> 252  
 <212> DNA  
 <213> *Streptococcus aureus*

<400> 48  
 atgattattaaaatttccatacgctcga cagaattttaa aggacttat gacaaaagta 60  
 aatgatgata gtgatgtatggtaactgtaaaca tctactgtat ataaaaacgt agtaatcatg 120  
 tcagaatcag attataactc catgtatggaa acactttacc tccaaacagaa cccaaataat 180  
 gctgaacact tagctcaatc aattgcagat ctagaacgtg ggaaaaactat aacgaaagat 240  
 atagatgtat aa 252

<210> 49  
 <211> 267  
 <212> DNA  
 <213> *Streptococcus aureus*

<400> 49	atggcttagt taaatattac gtttgcct caagcttt aagattataa gtatttcag	60
	cagaacaata aaaaaatggt gaagaagatt aatgagttac taaaagtat tgacagaaat	120
	ggtgcatgg aaggatagg taagcctgaa aagtaaaat cgaatctgac tgggtattat	180
	atagacgta tcaatcacga acatagattt gtttatacag tagatgacaa tcatataaaa	240
	atagcatcat gtaaatacca ttat	267
<210> 50		
<211> 255		
<212> DNA		
<213> <i>Streptococcus pneumoniae</i>		
<400> 50	atgaaagcag tccttactc aacattccga aatcatttaa aggactacat gaagaaggta	60
	aatgatgaat ttgagcctt gacgggtgtc aataaaaatc cagatgagga cattgtatgc	120
	ctttcaaaaga gtgagtggtt tagtatccaa gaaaccctga gaattgctca aaataaggaa	180
	ctttctgata aggttttgcg aggaatggct caagttcgat ctggaagtac tcaggtccat	240
	gttattgagg agtaa	255
<210> 51		
<211> 255		
<212> DNA		
<213> <i>Streptococcus pneumoniae</i>		
<400> 51	atgctgctca agtttacaga agatgcctgg gcagattatt gctactggca aaatcaggat	60
	aagaaaaacgt taaaaagaat caataaaacta atcaaggata ttcaacgtga tcccttaca	120
	ggaataggtt aaccagaacc actcaaataat gattaccaag gacccgtgtc acggcgtatt	180
	gatgcagaaa atcgcttgat ttatatgtat gatggagata gcgtggctt cttgtcctt	240
	aaagatcatt actaa	255
<210> 52		
<211> 264		
<212> DNA		
<213> <i>Streptomyces coelicolor</i>		
<400> 52	atgtccatca ccgcacgca agcccgtagt aacctgtcc cgctgataga gcaggtaac	60
	gaggaccacg ccccggtgca catcacctcc cgcaagggtt acgcccgtgtc catgtccgag	120
	gaggacttca cggcgtggac ggagacgggtt catctccgtc gctcgccgag gaacgcccgc	180
	cgtctgctcg actccatcgc ggaggccgag gcgggcgacg cgactgagca cgacctgatc	240
	gaccggacg cggagcgggc gtga	264
<210> 53		
<211> 255		
<212> DNA		
<213> <i>Streptomyces coelicolor</i>		
<400> 53	gtgaggatca ctttacgtc ccacggctgg gaggactacg tccactgggc cgagagcgac	60
	cgaaagggtga ccaagcgat caacagactg atcgccgaca tcgccccgtga cccgttcaag	120
	ggcgtcggca agccggagcc gctcaagggtt gacctgtccg gctactggtc acggcgtatc	180
	gacgacacgc accgtttgtt gtacaagccc accgatgacc agctggtcat cgtccaggcg	240
	cgctaccact actga	255

<210> 54  
 <211> 282  
 <212> DNA  
 <213> *Streptomyces viridochromogenes*

<400> 54  
 atgtcgataa accgcgagcg aagccgcaag gctctttc cgctgatcaa gaaggtcaac 60  
 gacaatcagc aggcacatcg gatcgctcc aagcacggca acgcccgtact cgtctcgcc 120  
 gaggattatg cagcgcgtcg cgagggtcg tacctgctgc gctctccggc gaacgcccgt 180  
 cgactgctca aggcgtacga gaacgcctt gcccacgtca atgtgtcgga gcgggagctg 240  
 atcgatccgg attcggcgga cgctgggtcg ggtgcccgt ga 282

<210> 55  
 <211> 255  
 <212> DNA  
 <213> *Streptomyces viridochromogenes*

<400> 55  
 gtgaggcctg tttcgagga tcagggctgg gatgactaca cgtcctggct caagaacgac 60  
 cgcaagatgc tcgccccat caacaagctc atcgaggacg tcagggcgca ccccttcacg 120  
 gggatcgca aacccgagcc gctgaagtac cacttgcggg gggcggtgtc gcggcggatc 180  
 gacgacgaac accgcctcggt acgtgtgtt acggacaagg agatcgat cctcgctgcc 240  
 cggtaccact actga 255

<210> 56  
 <211> 303  
 <212> DNA  
 <213> *Synechocystis* sp. PCC 7942

<400> 56  
 ttggctaagt gctattgttg tacaacaagc tgtacaactc ctcggctcat gaaagttgtt 60  
 tccttcagtg acgcccagaaa aaatctcaag actgtcttgg atgaagtctgt caacgacgct 120  
 gactacacga tcattactcg ccgcaatgcc gaggaaagtgc tggcatgtc cctcgactcc 180  
 ttcaatagcc tgatcgaaac ctcccacctg ctcaaattccc ctgccaatgc tgctcaccta 240  
 caacgctcga tcgctcagta ccagcaaggt caaacagtcg agcgaaatct attagatgcg 300  
 taa 303

<210> 57  
 <211> 264  
 <212> DNA  
 <213> *Synechocystis* sp. PCC 7942

<400> 57  
 atgcgtaaac tggcttggac aaacgaggct tggaaagatt acctgtattt gcaagggcag 60  
 gacaagaaga ctttaatcg catcaacaag ctcattaccg aaaccttgcg atcgcccttt 120  
 gaggggatgtt gtaagccaga agcgctcagg gagaacctga ctgggtttt gtcacgcccgc 180  
 attgacgaca ccaatcgctt agtttacgca gtagcagatg actacacctgac cattatttcc 240  
 tgcgttacc actacagcga ttaa 264

<210> 58  
 <211> 264  
 <212> DNA  
 <213> *Synechocystis* sp. PCC 6803 A

<400> 58  
 atgaaagcaa ttacaaccac ccaagccaaa gatcatttgg atgaattaat taatgtgtc 60  
 atttctgtatc tagaaccaac catcggttagc aacaatcaag gtcagcaggc ggtattaata 120

tcattggatg aatttaattc ttggcaagaa accctttact tactctctaa tccaaccaac	180
gcagaacatt taatggcatc gattaagcaa gctgaaactg gacagatcat taagcaaaaa	240
ttaccagatt tattgaaact gtga	264
<210> 59	
<211> 261	
<212> DNA	
<213> <i>Synechocystis</i> sp. PCC 6803 A	
<400> 59	
gtgaaaatcg ccttaccga gctatcttgg catgattacc tctgggttca gcaaaatgat	60
aaaaaaacttc tcaaaaagaat taatttactc attaaggcaa ttgccaggga tcctttgat	120
ggtataggaa aaccagaacc actcaaagca aatcttccg gttactggtc gaggcgcatc	180
aattctgagc atcgtttgggt gtacacgatt gctgatcgag atttactaat tatttcctgc	240
cgattccatt atcaaaggta a	261
<210> 60	
<211> 264	
<212> DNA	
<213> <i>Synechocystis</i> sp. PCC 6803 B	
<400> 60	
atggaaacca ttaatttatca acaattctct gaaaaactgc ccactttggt agaaaaaaaata	60
ggtaatgagc aagaacctct ctgtcttagag cttccgaatt atttacgagc tgttattata	120
tctgagcaag attaccgttag tttgatggaa actgtttatc tgttgagtaa ccctgttaat	180
gctgaaaagt tattaaactac cgctagtcga tcaattgatc aagctacatc gtggacaaaa	240
gtaaaaaaaaatg acttaggact atga	264
<210> 61	
<211> 261	
<212> DNA	
<213> <i>Synechocystis</i> sp. PCC 6803 B	
<400> 61	
atgaaggaaag ttgtttttaga ttgcaggca attgaagata taaagtggtg gattcaacaa	60
gataaaaaagt tagcgtaaa aatcatggaa ttaattgaga cgctaccaaa atcaccttt	120
gccggcaaaag gaaaaccaga aaaacttcgt tttatttgc caggttttg gccacggcgc	180
attactcaag agcatcgct agtttacgaa gtcaccgatg atttcattcg tggtgtcagt	240
tgtcgttatc attaccgata g	261
<210> 62	
<211> 243	
<212> DNA	
<213> <i>Tiobacillus ferrooxidant</i>	
<400> 62	
atgtccaccc tcactgcaag cgaagcacgc gccaacctat atcggtcat tgaccaagcc	60
gctgagtcac atcagcccat ttatatcgcc ggaaagcgga caagtgcggc cttctctcc	120
acggaaagatt gggaaagcaat ccaagaaaca ctataccctcc tttccgttcc gggcatgcgc	180
gaatctatca aggagggtat ggctgagccc cttagcaaga gcaatatgga cctcaagtgg	240
tga	243
<210> 63	
<211> 252	
<212> DNA	
<213> <i>Tiobacillus ferrooxidant</i>	

<400> 63		
gtggcttatt cgaaacacgc gcagaaggat gcgaagaagc tggcggtgc tggcttaaaa	60	
aacaacgcaa tagaactcct ggccgttctt gccgcccgc catttcagaa cccggccaccc	120	
tacgagaatc tcgttaggcga cctcgccggc gcgtattcac gacgcataa cattcagcat	180	
cgttggttt atgaagtctt tccaaaggag cgagtggtc gcgtgttgcg catgtggacg	240	
cactatgagt ga	252	
<210> 64		
<211> 252		
<212> DNA		
<213> Yersinia enterocolitica		
<400> 64		
atgagaacaa ttagttatag tgaagcgcgc cagaatttgt cgacaacgat ggtgcaaacg	60	
gttggaggatc gagccccat cctcatcacc cgtcaaaatg ggacttcttg ttttttatg	120	
tcacttgaag aatatgaatc attggaagaa actgcttatt tattgcgttc accagcaaac	180	
gcgaaggact tcatggactc aattgaagag ttgagagcag gaaaaggaat tcaaaggaa	240	
cttgaagcgt ga	252	
<210> 65		
<211> 255		
<212> DNA		
<213> Yersinia enterocolitica		
<400> 65		
gtgaaaatta tattttccag ttgttcttgg gaggattatc tttattggca acaaacggat	60	
aagaaaatcc tcaaacgcataatgggtta gtaaaaaata ttcaaaagaac gccatttgag	120	
gtaaaggggca aaccagaacc ccttaaacat aatctggcag gttctggtc acggaggatg	180	
acagaagagc acagacttgtt ttaggagtt tccgggtata atttattaaat tgctgcttat	240	
cgttactatt attga	255	
<210> 66		
<211> 210		
<212> DNA		
<213> Yersinia enterocolitica.		
<400> 66		
atgaatagca tcagttatac agccgcaaga aataatttag ccaaggattt attggaagca	60	
caaaagcagc ccgtagaaat cacgcgcgtt gggcagatg aggtctatata tattcagcaag	120	
gctgattatg aggatttgat gaaagcaaag gtaaaggcac atattcaatt taaacatgca	180	
gaaaccattt aagctttgc tgatagatga	210	
<210> 67		
<211> 357		
<212> DNA		
<213> Yersinia enterocolitica		
<400> 67		
atgatatttt taacggcaaa tgatattgcg gagtttaacg cagaaattat ccctaacggc	60	
aggcctgata atagtaagat tgaggctgtt gccagccgc tattaaatgc acatcattat	120	
gacaacgtgg atgatgtata tcagttgcc gctatctact taattgccat tagtcgaggt	180	
cacatttttc ttgtatggaa caagcgcacg gcatttcaaa gcatggcgct gttcccttgg	240	
ataaaatggcg tagacctgtt tgcaagcaat caactggaaag aattaaccgt tgaagcagcg	300	
caaggaaaaa ttgggtttga gcagataacg gaacagttac gcgagcttac cgagtaa	357	

<210> 68  
 <211> 83  
 <212> PRT  
 <213> *Actinobacillus actinomycetemcomitans*  
 <400> 68  
  
 Met Asn Val Ile Ser Tyr Ser Ala Phe Arg Ala Glu Leu Ala Thr Thr  
 1 5 10 15

Leu Asp Gln Val Val Ala Asp His Ser Pro Val Met Ile Thr Arg Gln  
 20 25 30

Asn Gly Lys His Ala Val Val Met Ser Leu Glu Asp Phe Ala Ala Tyr  
 35 40 45

Glu Glu Thr Ala Tyr Leu Leu Arg Ser Pro Lys Asn Arg Glu Arg Leu  
 50 55 60

Leu Ala Ser Ile Asp Gln Leu Asn Ser Gly Lys Ile Ile Glu Arg Glu  
 65 70 75 80

Leu Gln Glu

<210> 69  
 <211> 84  
 <212> PRT  
 <213> *Actinobacillus actinomycetemcomitans*  
 <400> 69  
  
 Met Ile Leu Ala Trp Thr Glu Thr Ala Trp Glu Asp Tyr Leu Tyr Trp  
 1 5 10 15

Gln Gln Val Asp Lys Lys Thr Leu Leu Arg Ile Asn Lys Leu Ile Gln  
 20 25 30

Asn Ile Thr Arg Ser Pro Phe Glu Gly Leu Gly Asn Pro Lys Pro Leu  
 35 40 45

Lys His Gln Leu Ser Gly Phe Trp Ser Arg Arg Ile Asp Lys Glu His  
 50 55 60

Arg Leu Val Tyr Gln Val Ser Asp Ser His Leu Thr Ile Ile Gln Cys  
 65 70 75 80

Arg Tyr His Tyr

<210> 70  
 <211> 84  
 <212> PRT  
 <213> *Agrobacterium tumefaciens*  
 <400> 70  
  
 Met Ala Asn Val Arg Phe Thr Glu Phe Arg Gln Asn Phe Ala Thr His  
 1 5 10 15

Phe Asp Arg Val Leu Glu Thr Arg Ala Pro Leu Leu Val Thr Arg Gln  
 20 25 30

Gly Lys Glu Ala Val Val Leu Ala Glu Gly Glu Tyr Glu Ser Met  
 35 40 45

Gln Glu Thr Leu His Leu Leu Ser Asn Pro Ala Asn Ala Ser Arg Leu  
 50 55 60

Arg Ala Ser Met Gly Glu Leu Glu Arg Gly Asp Thr Ile Glu Arg Asp  
 65 70 75 80

Pro Thr Glu Glu

<210> 71  
 <211> 89  
 <212> PRT  
 <213> Agrobacterium tumefaciens

<400> 71

Met Lys Leu Val Trp Thr Leu Ser Ser Trp Asp Asp Tyr Glu Phe Trp  
 1 5 10 15

Gln Arg Thr Asp Ala Arg Met Val Glu Lys Ile Asn Asp Leu Ile Arg  
 20 25 30

Asn Ala Lys Arg Thr Pro Phe Ala Gly Leu Gly Lys Pro Glu Pro Leu  
 35 40 45

Lys Gly Asp Met Ala Gly Tyr Trp Ser Arg Arg Ile Thr Ala Glu His  
 50 55 60

Arg Phe Val Tyr Arg Val Ser Gly Ser Gly Ser Glu Gln Arg Leu Glu  
 65 70 75 80

Val Ile Gln Cys Arg Phe His Tyr Gln  
 85

<210> 72  
 <211> 82  
 <212> PRT  
 <213> Burkholderia cepacia

<400> 72

Met Asn Val Leu Thr Tyr Ser Glu Ala Arg Ala Gly Phe Lys Gln Ala  
 1 5 10 15

Met Asp Asp Val Cys Arg Asp His Ile Pro Met Leu Ile Thr Arg Gln  
 20 25 30

Thr Gly Glu Asn Val Val Met Val Ser Leu Ala Asp Phe Asn Ala Met  
 35 40 45

Gln Glu Thr Leu Tyr Leu Leu Ser Ser Ser Lys Asn Ala Gln Arg Leu  
 50 55 60

Ala Arg Ser Ile Ala Gln Leu Asn Ala Gly Gly Ala Thr Ala Arg Glu  
 65 70 75 80

Leu Leu

<210> 73  
 <211> 83  
 <212> PRT  
 <213> Burkholderia cepacia

<400> 73

Met Phe Thr Asp Asp Ala Trp Asp Asp Tyr Leu Tyr Trp Gln Glu Thr  
1 5 10 15

Asp Arg Lys Val Val Arg Lys Ile Asn Thr Leu Leu Glu Glu Cys Arg  
20 25 30

Arg Asp Pro Tyr Arg Gly Thr Gly Lys Pro Glu Ala Leu Met Gly Ser  
35 40 45

Met Ser Gly Leu Trp Ser Arg Arg Ile Thr Leu Ala Asp Arg Leu Val  
50 55 60

Tyr Leu Pro Arg Asp Gly Lys Ile Tyr Val Ile Ala Phe Arg Phe His  
65 70 75 80

Tyr Asp Cys

<210> 74  
<211> 84  
<212> PRT  
<213> *Coxiella burnetii*

<400> 74

Met Asn Val Val Thr Phe Ser Glu Leu Arg Ala Gln Leu Lys Lys Ile  
1 5 10 15

Leu Asp Leu Ser Ala Asp Gln His Glu Pro Val Val Val Lys Arg Pro  
20 25 30

Asn Lys Glu Thr Met Val Ile Leu Ser Leu Arg Asp Phe Glu Ala Leu  
35 40 45

Lys Glu Thr Ala Tyr Leu Leu Ser Asn Glu Ala Asn Ala Ala Arg Leu  
50 55 60

Arg Gln Ser Ile Arg Ser Leu Lys Gln Gly Lys Ala Gln Lys Lys Lys  
65 70 75 80

Leu Met Glu Asp

<210> 75  
<211> 91  
<212> PRT  
<213> *Coxiella burnetii*

<400> 75

Met Gln Ile Ser Phe Thr Pro Glu Ala Trp Glu Asp Tyr Leu Tyr Trp  
1 5 10 15

Gln Lys Phe Asp Lys Lys Met Leu Arg Arg Ile Asn Glu Leu Ile Lys  
20 25 30

Asp Ala Met His Glu Pro Phe Ser Gly Lys Gly Lys Pro Glu Pro Leu  
35 40 45

Lys Phe Glu Leu Gln Gly Tyr Trp Ser Arg Arg Leu Asp Gln Glu His  
50 55 60

Arg Leu Val Tyr Lys Val Leu Asp Asp Ser Leu Met Ile Ile Ala Ala  
 65 70 75 80

Arg Phe His Tyr Asn Arg Leu Asn Ser Lys Asn  
 85 90

<210> 76  
 <211> 92  
 <212> PRT  
 <213> Escherichia coli  
 <400> 76

Met Asn Cys Thr Lys Glu Glu Ile Asp Met Arg Thr Ile Ser Tyr Ser  
 1 5 10 15

Glu Ala Arg Gln Asn Leu Ser Ala Thr Met Met Lys Ala Val Glu Asp  
 20 25 30

His Ala Pro Ile Leu Ile Thr Arg Gln Asn Gly Glu Ala Cys Val Leu  
 35 40 45

Met Ser Leu Glu Glu Tyr Asn Ser Leu Glu Glu Thr Ala Tyr Leu Leu  
 50 55 60

Arg Ser Pro Ala Asn Ala Arg Arg Leu Met Asp Ser Ile Asp Ser Leu  
 65 70 75 80

Lys Ser Gly Lys Gly Thr Glu Lys Asp Ile Ile Glu  
 85 90

<210> 77  
 <211> 84  
 <212> PRT  
 <213> Escherichia coli  
 <400> 77

Met Lys Leu Ile Trp Ser Glu Glu Ser Trp Asp Asp Tyr Leu Tyr Trp  
 1 5 10 15

Gln Glu Thr Asp Lys Arg Ile Val Lys Lys Ile Asn Glu Leu Ile Lys  
 20 25 30

Asp Thr Arg Arg Thr Pro Phe Glu Gly Lys Gly Lys Pro Glu Pro Leu  
 35 40 45

Lys His Asn Leu Ser Gly Phe Trp Ser Arg Arg Ile Thr Glu Glu His  
 50 55 60

Arg Leu Val Tyr Ala Val Thr Asp Asp Ser Leu Leu Ile Ala Ala Cys  
 65 70 75 80

Arg Tyr His Tyr

<210> 78  
 <211> 89  
 <212> PRT  
 <213> Enterococcus faecium  
 <400> 78

Met Glu Ala Val Ala Tyr Ser Asn Phe Arg Gln Asn Leu Arg Ser Tyr  
 1 5 10 15

Met Lys Gln Val Asn Glu Asp Ala Glu Thr Leu Ile Val Thr Ser Lys  
 20 25 30

Asp Val Glu Asp Thr Val Val Leu Ser Lys Arg Asp Tyr Asp Ser  
 35 40 45

Met Gln Glu Thr Leu Arg Thr Leu Ser Asn Asn Tyr Val Met Glu Lys  
 50 55 60

Ile Arg Arg Gly Asp Glu Gln Phe Ser Lys Gly Ala Phe Lys Thr His  
 65 70 75 80

Asp Leu Ile Glu Val Glu Ser Asp Asp  
 85

<210> 79  
 <211> 85  
 <212> PRT  
 <213> Enterococcus faecium

<400> 79

Met Ile Lys Ala Trp Ser Asp Asp Ala Trp Asp Asp Tyr Leu Tyr Trp  
 1 5 10 15

His Glu Gln Gly Asn Lys Ser Asn Ile Lys Lys Ile Asn Lys Leu Ile  
 20 25 30

Lys Asp Ile Asp Arg Ser Pro Phe Ala Gly Leu Gly Lys Pro Glu Pro  
 35 40 45

Leu Lys His Asp Leu Ser Gly Lys Trp Ser Arg Arg Ile Thr Asp Glu  
 50 55 60

His Arg Leu Ile Tyr Arg Val Glu Asn Glu Thr Ile Phe Ile Tyr Ser  
 65 70 75 80

Ala Lys Asp His Tyr  
 85

<210> 80  
 <211> 85  
 <212> PRT  
 <213> Francisella tularensis

<400> 80

Met Gln Thr Val Asn Tyr Ser Thr Phe Arg Asn Glu Leu Ser Asp Ser  
 1 5 10 15

Met Asp Arg Val Thr Lys Asn His Ser Pro Met Ile Val Thr Arg Gly  
 20 25 30

Ser Lys Lys Glu Ala Val Val Met Met Ser Leu Glu Asp Phe Lys Ala  
 35 40 45

Tyr Glu Glu Thr Ala Tyr Leu Met Arg Ser Met Asn Asn Tyr Lys Arg  
 50 55 60

Leu Gln Asn Ser Ile Asp Glu Val Glu Ser Gly Leu Ala Ile Gln Lys  
 65 70 75 80

Glu Leu Ile Glu Glu

<210> 81  
 <211> 68  
 <212> PRT  
 <213> Francisella tularensis

<400> 81

Met Ile Leu Ser Trp Ser Thr Asn Ala Trp Glu Asp Tyr Leu Tyr Trp  
 1 5 10 15

Gln Ser Ile Asp Lys Lys Leu Lys Arg Ile Asn Leu Leu Ile Lys  
 20 25 30

Asp Ile Met Arg Asn His Phe Glu Gly Leu Gly Glu Pro Glu Pro Leu  
 35 40 45

Lys His Asn Phe Ser Gly Tyr Trp Ser Arg Arg Ile Asp Lys Glu His  
 50 55 60

Leu Asn Asn Leu  
 65

<210> 82  
 <211> 73  
 <212> PRT  
 <213> Klebsiella pneumoniae

<400> 82

Met Arg Thr Val Asn Tyr Ser Glu Ala Arg Gln Asn Leu Ala Asp Val  
 1 5 10 15

Leu Glu Ser Ala Val Thr Gly Val Pro Val Thr Ile Thr Arg Arg Gly  
 20 25 30

His Lys Ser Ala Val Ile Ile Ser Ala Glu Glu Phe Glu Arg Tyr Gln  
 35 40 45

Ala Ala Arg Met Asp Asp Glu Phe Ala Ala Ile Met Ala Val His Gly  
 50 55 60

Asp Glu Ile Arg Glu Leu Ala Asp Lys  
 65 70

<210> 83  
 <211> 122  
 <212> PRT  
 <213> Klebsiella pneumoniae

<400> 83

Met Thr Leu Gln Ile Ile Ser Ala Glu Glu Ile Ile Gln Phe His Asp  
 1 5 10 15

Arg Leu Leu Arg Val Thr Pro Gly Val Ala Gly Met Pro Asp Pro Gly  
 20 25 30

Arg Ala Glu Ala Ile Met Tyr Arg Val Leu Asn Lys Ile Glu Tyr Glu  
 35 40 45

Gly Val Thr Asp Val Trp Arg Leu Ala Ala Met His Leu Leu Ala Ile  
 50 55 60

## 21

Ser Arg Gly His Ile Phe Asn Asp Gly Asn Lys Arg Thr Ala Leu Phe  
 65 70 75 80

Ile Thr Leu Leu Phe Leu Lys Arg Asn Gly Ile Ile Leu Pro Ala Asn  
 85 90 95

Pro Asp Phe Val Gly Met Thr Val Glu Ala Ala Ala Gly Gln Leu Thr  
 100 105 110

Leu Glu Gln Ile Val Ala Arg Leu Arg Gly  
 115 120

<210> 84  
 <211> 91  
 <212> PRT  
 <213> *Mycobacterium bovis*  
 <400> 84

Met Ser Ile Ser Ala Ser Glu Ala Arg Gln Arg Leu Phe Pro Leu Ile  
 1 5 10 15

Glu Gln Val Asn Thr Asp His Gln Pro Val Arg Ile Thr Ser Arg Ala  
 20 25 30

Gly Asp Ala Val Leu Met Ser Ala Asp Asp Tyr Asp Ala Trp Gln Glu  
 35 40 45

Thr Val Tyr Leu Leu Arg Ser Pro Glu Asn Ala Arg Arg Leu Met Glu  
 50 55 60

Ala Val Ala Arg Asp Lys Ala Gly His Ser Ala Phe Thr Lys Ser Val  
 65 70 75 80

Asp Glu Leu Arg Glu Met Ala Gly Gly Glu Glu  
 85 90

<210> 85  
 <211> 85  
 <212> PRT  
 <213> *Mycobacterium bovis*  
 <400> 85

Met Arg Ser Val Asn Phe Asp Pro Asp Ala Trp Glu Asp Phe Leu Phe  
 1 5 10 15

Trp Leu Ala Ala Asp Arg Lys Thr Ala Arg Arg Ile Thr Arg Leu Ile  
 20 25 30

Gly Glu Ile Gln Arg Asp Pro Phe Ser Gly Ile Gly Lys Pro Glu Pro  
 35 40 45

Leu Gln Gly Glu Leu Ser Gly Tyr Trp Ser Arg Arg Ile Asp Asp Glu  
 50 55 60

His Arg Leu Val Tyr Arg Ala Gly Asp Asp Glu Val Thr Met Leu Lys  
 65 70 75 80

Ala Arg Tyr His Tyr  
 85

<210> 86  
 <211> 91

<212> PRT  
 <213> *Mycobacterium tuberculosis*

<400> 86

Met Ser Ile Ser Ala Ser Glu Ala Arg Gln Arg Leu Phe Pro Leu Ile  
 1 5 10 15

Glu Gln Val Asn Thr Asp His Gln Pro Val Arg Ile Thr Ser Arg Ala  
 20 25 30

Gly Asp Ala Val Leu Met Ser Ala Asp Asp Tyr Asp Ala Trp Gln Glu  
 35 40 45

Thr Val Tyr Leu Leu Arg Ser Pro Glu Asn Ala Arg Arg Leu Met Glu  
 50 55 60

Ala Val Ala Arg Asp Lys Ala Gly His Ser Ala Phe Thr Lys Ser Val  
 65 70 75 80

Asp Glu Leu Arg Glu Met Ala Gly Gly Glu Glu  
 85 90

<210> 87  
 <211> 85  
 <212> PRT  
 <213> *Mycobacterium tuberculosis*

<400> 87

Met Arg Ser Val Asn Phe Asp Pro Asp Ala Trp Glu Asp Phe Leu Phe  
 1 5 10 15

Trp Leu Ala Ala Asp Arg Lys Thr Ala Arg Arg Ile Thr Arg Leu Ile  
 20 25 30

Gly Glu Ile Gln Arg Asp Pro Phe Ser Gly Ile Gly Lys Pro Glu Pro  
 35 40 45

Leu Gln Gly Glu Leu Ser Gly Tyr Trp Ser Arg Arg Ile Asp Asp Glu  
 50 55 60

His Arg Leu Val Tyr Arg Ala Gly Asp Asp Glu Val Thr Met Leu Lys  
 65 70 75 80

Ala Arg Tyr His Tyr  
 85

<210> 88  
 <211> 98  
 <212> PRT  
 <213> *Neisseria europea A*

<400> 88

Met Ala Glu Cys Asn Val Gln Ile Asn Val Gln Leu Glu Asn Leu Met  
 1 5 10 15

Asp Ala Ile Thr Tyr Ser Thr Ala Arg Ala Lys Leu Ala Asp Thr Met  
 20 25 30

Asn Arg Val Cys Asp Asn His Glu Pro Ile Ile Ile Thr Arg Asn Gly  
 35 40 45

Glu Gln Ser Val Val Met Met Ser Leu Asp Asp Phe Lys Ala Leu Glu

50 55 60

Glu Thr Ser Tyr Leu Leu Arg Ser Pro Lys Asn Ala Lys Arg Leu Leu  
 65 70 75 80

Glu Ser Ile Ala Ala Leu Glu Ser Gly Arg Gly Glu Thr Arg Ser Leu  
 85 90 95

Ala Glu

<210> 89  
 <211> 84  
 <212> PRT  
 <213> Neisseria europea A

<400> 89

Met Lys Leu Val Phe Ser Glu Gln Ala Trp Glu Asp Tyr Leu Tyr Trp  
 1 5 10 15

Gln Lys Thr Asp Arg Lys Thr Val Gln Arg Ile Asp Thr Leu Val Lys  
 20 25 30

Glu Ile Thr Arg Thr Pro His Glu Gly Thr Gly Lys Pro Glu Pro Leu  
 35 40 45

Lys His Ala Leu Ser Gly Tyr Trp Ser Arg Arg Ile Asn Asn Glu His  
 50 55 60

Arg Ile Val Tyr Lys Ile Ala Asp Asp Ser Leu Phe Ile Ala Gln Leu  
 65 70 75 80

Arg Tyr His Tyr

<210> 90  
 <211> 102  
 <212> PRT  
 <213> Neisseria europea B

<400> 90

Met Tyr Leu Phe Tyr Thr Cys Thr Ile Tyr Cys Ala Asn Glu Val Ala  
 1 5 10 15

Met Lys Val Val Thr Tyr Ser His Ala Arg Asn Ala Leu Lys Ser Ile  
 20 25 30

Leu Asp Asp Val Ile Gln Asp Ala Asp Val Ile Val Ile Ser Arg Arg  
 35 40 45

Asp Ala Glu Gly Asp Ala Val Val Met Ser Leu Asp Ser Tyr Asn Ser  
 50 55 60

Ile Met Glu Thr Leu His Leu Thr Ser Asn Pro Ala Asn Ala Ala Ala  
 65 70 75 80

Leu Ala Lys Ala Ile Ala Gln Asp Lys Ala Gly Gln Ala Gln Asp His  
 85 90 95

Pro Leu Leu Ser Ala Asp  
 100

<210> 91  
 <211> 86  
 <212> PRT

<213> Neisseria europea B

<400> 91

Met Arg Ala Ile Arg Phe Val Pro Asp Ala Trp Glu Ala Tyr Leu Tyr  
 1 5 10 15

Trp Gln Asp Gln Asp Lys Lys Thr Leu Arg Arg Leu Asn Ser Leu Ile  
 20 25 30

Thr Ala Ala Ser Arg Asp Pro Phe Val Gly Ile Gly Lys Pro Glu Pro  
 35 40 45

Leu Arg Gly Glu Leu Ser Gly Tyr Trp Ser Arg Arg Ile Asp Glu Thr  
 50 55 60

Asn Arg Leu Val Tyr Arg Val Thr Asp Val Glu Leu Val Ile Ile Ala  
 65 70 75 80

Cys Arg Phe His Tyr Glu  
 85

<210> 92  
 <211> 80  
 <212> PRT

<213> Neisseria europea C

<400> 92

Met Ala Ile Leu Asn Ala Thr Glu Ala Arg Ala Arg Leu Tyr Ala Leu  
 1 5 10 15

Ile Asp Glu Ala Ala Glu Thr His Gln Pro Ile Val Ile Lys Gly Lys  
 20 25 30

Arg Ser Ser Ala Val Leu Leu Ser Glu Glu Asp Trp Asn Ala Ile Asn  
 35 40 45

Glu Thr Leu Tyr Leu Val Ser Ile Pro Gly Met Arg Glu Ser Ile Met  
 50 55 60

Glu Gly Met Lys Thr Asp Val Asp Glu Cys Ser Arg Glu Leu Asp Trp  
 65 70 75 80

<210> 93  
 <211> 86  
 <212> PRT

<213> Neisseria europea C

<400> 93

Met Trp Glu Leu Arg Tyr Thr His Gln Ala Gln Lys Asp Ala Lys Lys  
 1 5 10 15

Leu Ala Ser Ser Gly Leu Lys Asp Lys Ala Glu Glu Leu Leu Ala Val  
 20 25 30

Val Arg Asn Asn Pro Tyr Gln Thr Pro Pro Pro Tyr Glu Lys Leu Val  
 35 40 45

Gly Asp Leu Ala Gly Ala Cys Ser Arg Arg Ile Asn Ile Gln His Arg  
 50 55 60

Leu Val Tyr Gln Val Leu Glu Arg Glu Arg Ile Val Lys Val Leu Arg  
 65 70 75 80

Met Trp Thr His Tyr Val  
 85

<210> 94  
 <211> 135  
 <212> PRT  
 <213> Nostoc sp. PCC 7120

<400> 94

Met Tyr Trp Ile Lys Phe Glu Ser Thr Gln Arg Glu Leu Leu Ile Leu  
 1 5 10 15

Met Leu Ser Asn Thr Tyr Thr Tyr Thr Gln Ala Arg Asp Arg Leu Ser  
 20 25 30

Glu Leu Cys Asp Lys Val Thr Ser Glu Arg Asp Phe Val Val Ile Thr  
 35 40 45

Arg Arg Asn Ala Glu Asn Val Ala Leu Ile Pro Val Asp Glu Leu Ser  
 50 55 60

Ser Leu Leu Glu Thr Ala His Leu Leu Arg Ser Pro Arg Asn Ala Glu  
 65 70 75 80

Arg Leu Leu Arg Ala Leu Asp Arg Ala Lys Ser Gly Val Val Glu Ser  
 85 90 95

Gln Ser Leu Asp Asp Ile Arg Lys Glu Leu Gly Phe Asp Gln Lys Glu  
 100 105 110

Glu Ser Gln Lys Pro Ile Lys Arg Arg Ser Ser Ser Asn Ser Lys Ala  
 115 120 125

Lys Lys Asn Ser Val Ser Thr  
 130 135

<210> 95  
 <211> 81  
 <212> PRT  
 <213> Nostoc sp. PCC 7120

<400> 95

Met Phe Gln Pro Glu Phe Leu Glu Asp Leu Glu Phe Trp Val Glu Thr  
 1 5 10 15

Asn Gln Arg Val Ala Leu Lys Ala Leu Asp Leu Val Lys Glu Thr Cys  
 20 25 30

Arg Asp Pro Phe Lys Gly Lys Gly Lys Pro Glu Pro Leu Lys Tyr Leu  
 35 40 45

Asp Pro Asp Thr Trp Ser Arg Arg Leu Thr Gln Glu His Arg Ile Val  
 50 55 60

Tyr Leu Val Lys Asp Asp Glu Ile Asn Phe Leu Gln Ala Arg Tyr His  
 65 70 75 80

Tyr

<210> 96  
 <211> 84  
 <212> PRT  
 <213> *Pseudomonas fluorescence*

&lt;400&gt; 96

Met Asp Thr Ile Asn Tyr Thr Thr Ala Arg Ala His Leu Ala Glu Thr  
 1 5 10 15

Met Asp Arg Val Asn Glu Asp Cys Ala Pro Leu Leu Val Thr Arg Gln  
 20 25 30

Lys Gly Glu Pro Val Val Met Ser Leu Ala Glu Tyr Asn Ala Leu  
 35 40 45

Glu Glu Thr Ala Tyr Leu Leu Arg Ser Pro Ala Asn Ala Glu Arg Leu  
 50 55 60

Ile Lys Ser Ile Gly Glu Met Arg Ala Gly Lys Ala Lys Val Arg Gln  
 65 70 75 80

Leu Ile Glu Glu

<210> 97  
 <211> 84  
 <212> PRT  
 <213> *Pseudomonas fluorescence*

&lt;400&gt; 97

Met Lys Ile Gln Phe Thr Pro Thr Gly Trp Glu Asp Tyr Leu Trp Phe  
 1 5 10 15

Gln Gln Asn Asp Lys Ala Gly Leu Lys Arg Ile Asn Leu Leu Ile Lys  
 20 25 30

Ala Ile Gln Arg Gln Pro Phe Glu Gly Leu Gly Lys Pro Glu Pro Leu  
 35 40 45

Lys His Asn Met Ser Gly Phe Trp Ser Arg Arg Ile Thr Ala Glu His  
 50 55 60

Arg Leu Val Tyr Ala Ile Val Asp Gly Glu Ile Cys Val Ile Thr Cys  
 65 70 75 80

Arg Phe His Tyr

<210> 98  
 <211> 94  
 <212> PRT  
 <213> *Pseudomonas putida*

&lt;400&gt; 98

Met His Val Leu Thr Phe Ser Gln Ala Arg Ala Glu Leu Lys Gln Thr  
 1 5 10 15

Met Asp Asp Val Cys Arg Asp His Glu Pro Ala Val Ile Thr Arg Gln  
 20 25 30

Arg Gly Glu Pro Val Val Met Met Ser Leu Glu Asp Tyr Asn Gly Met  
 35 40 45

Asn Glu Thr Ile His Leu Leu Gly Ser Ser Lys Asn Ala Ser Arg Leu  
 50 55 60

Arg Ser Ser Ile Ala Gln Leu Arg Asp Gly Gln Ala Leu Thr Lys Glu  
 65 70 75 80

Leu Asp Leu Asn Gln Glu Pro Glu Ala Ala Glu Gln Glu  
 85 90

<210> 99

<211> 84

<212> PRT

<213> *Pseudomonas putida*

<400> 99

Met Lys Phe Thr Lys Glu Gly Trp Glu Asp Tyr Cys His Trp Gln Asn  
 1 5 10 15

Ala Asp Leu Thr Ile Leu Gly Asn Ile Asn Arg Leu Ile Asp Val Cys  
 20 25 30

Leu Arg Thr Pro Phe Thr Gly Ile Gly Lys Pro Glu Pro Leu Lys Gly  
 35 40 45

Asp Leu Ser Gly Leu Trp Ser Arg Arg Ile Thr Arg Glu His Arg Leu  
 50 55 60

Val Tyr Phe Phe Glu Ala Gly Met Leu Thr Val Leu Gln Cys Arg Tyr  
 65 70 75 80

His Tyr Asp Asp

<210> 100

<211> 92

<212> PRT

<213> *Pseudomonas syringae*

<400> 100

Met Gln Val Leu Ser Phe Ser Gln Ala Arg Ala Gly Leu Lys Gln Ala  
 1 5 10 15

Met Asp Asp Val Cys Arg Asp His Glu Pro Ala Leu Ile Thr Arg Leu  
 20 25 30

Arg Gly Asp His Val Val Met Leu Ser Leu Asp Asp Tyr Asn Ser Met  
 35 40 45

Ser Glu Thr Met Tyr Leu Leu Gly Thr Glu Ala Asn Ala Lys His Leu  
 50 55 60

Arg Gln Ser Ile Ala Gln His Lys Ala Gly Lys Ala Phe Val Lys Glu  
 65 70 75 80

Ile Ser Leu Asp Val Thr Gly Ser Glu Thr Glu Glu  
 85 90

<210> 101

<211> 82  
 <212> PRT  
 <213> *Pseudomonas syringae*

<400> 101

Met His Phe Thr Leu Ser Gly Trp Asp Asp Tyr Thr His Trp Lys Asp  
 1 5 10 15

Ala Asp Gln Ala Ile Ser Leu Ser Ile Asp Ser Leu Ile Ser Gln Cys  
 20 25 30

Leu Arg Thr Pro Phe Lys Gly Thr Gly Lys Pro Arg Pro Leu Thr Gly  
 35 40 45

Asp Leu Thr Gly Tyr Trp Ser Arg Arg Ile Thr Lys Glu His Arg Leu  
 50 55 60

Val Tyr Phe Tyr Glu Gly Val Leu Thr Val Ile Ala Cys Arg His  
 65 70 75 80

His Tyr

<210> 102  
 <211> 64  
 <212> PRT  
 <213> *Rickettsia conorii*

<400> 102

Met Asn Ser Ile Ser Gly Thr Ser Phe Arg Lys Asn Leu Ser Ser Val  
 1 5 10 15

Leu Asn Thr Val Glu Asn Asp His Val Pro Tyr Leu Ile Lys Arg Lys  
 20 25 30

Asn His Lys Asn Ile Ile Leu Leu Thr Glu Glu Tyr Glu Ser Thr  
 35 40 45

Lys Glu Thr Leu Tyr Leu Leu Ser Asn Leu Gly Leu Met Arg Ile Glu  
 50 55 60

<210> 103  
 <211> 78  
 <212> PRT  
 <213> *Rickettsia conorii*

<400> 103

Thr Leu Glu Ser Ala Glu Asp Leu Ala Tyr Trp Lys Lys Tyr Asp Ile  
 1 5 10 15

Lys Lys Tyr Glu Arg Ile Lys Leu Leu Ile Lys Asn Ile Gln Glu Ala  
 20 25 30

Pro Val Thr Gly Ile Gly Lys Pro Glu Pro Leu Lys His Ile Leu Ser  
 35 40 45

Gly Leu Trp Ser Arg Arg Ile Asn His Glu His Arg Leu Ile Tyr Ser  
 50 55 60

Val Asn Thr Lys Gln Ile Ile Tyr Asn Cys Ser Phe His  
 65 70 75

<210> 104  
 <211> 75  
 <212> PRT  
 <213> *Salmonella typhi*

<400> 104

Met Phe Met Arg Thr Val Asn Tyr Ser Glu Ala Arg Gln Asn Leu Ala  
 1 5 10 15

Glu Val Leu Glu Ser Ala Val Thr Gly Gly Pro Val Thr Ile Thr Arg  
 20 25 30

Arg Gly His Lys Ser Ala Val Ile Ile Ser Ala Glu Glu Phe Glu Arg  
 35 40 45

Tyr Gln Thr Ala Arg Met Asp Asp Glu Phe Ala Ala Ile Met Ala Val  
 50 55 60

His Gly Asn Glu Leu Arg Glu Leu Ala Asp Lys  
 65 70 75

<210> 105  
 <211> 122  
 <212> PRT  
 <213> *Salmonella typhi*

<400> 105

Met Thr Leu Gln Leu Ile Ser Ala Glu Glu Ile Ile Gln Phe His Asp  
 1 5 10 15

Arg Leu Leu Arg Val Thr Pro Gly Val Thr Gly Met Pro Asp Pro Gly  
 20 25 30

Arg Ala Glu Ala Leu Met Tyr Arg Val Leu Lys Gln Ile Glu Tyr Glu  
 35 40 45

Gly Val Thr Asp Val Trp Leu Leu Ala Ala Met His Leu Leu Ala Ile  
 50 55 60

Ser Arg Gly His Ile Phe Asn Asp Gly Asn Lys Arg Thr Ala Leu Phe  
 65 70 75 80

Ile Thr Leu Leu Phe Leu Lys Arg Asn Gly Ile Ser Leu Ala Ala Asn  
 85 90 95

Pro Asp Phe Val Asp Met Thr Val Asp Ala Ala Ala Gly Arg Leu Thr  
 100 105 110

Leu Glu Gln Ile Ala Val Arg Leu Arg Ala  
 115 120

<210> 106  
 <211> 83  
 <212> PRT  
 <213> *Streptococcus aureus*

<400> 106

Met Ile Ile Lys Asn Tyr Ser Tyr Ala Arg Gln Asn Leu Lys Ala Leu  
 1 5 10 15

Met Thr Lys Val Asn Asp Asp Ser Asp Met Val Thr Val Thr Ser Thr  
 20 25 30

Asp Asp Lys Asn Val Val Ile Met Ser Glu Ser Asp Tyr Asn Ser Met  
 35 40 45

Met Glu Thr Leu Tyr Leu Gln Gln Asn Pro Asn Asn Ala Glu His Leu  
 50 55 60

Ala Gln Ser Ile Ala Asp Leu Glu Arg Gly Lys Thr Ile Thr Lys Asp  
 65 70 75 80

Ile Asp Val

<210> 107  
 <211> 88  
 <212> PRT  
 <213> *Streptococcus aureus*

<400> 107

Met Ala Arg Leu Asn Ile Thr Phe Ser Pro Gln Ala Phe Glu Asp Tyr  
 1 5 10 15

Lys Tyr Phe Gln Gln Asn Asn Lys Lys Met Val Lys Lys Ile Asn Glu  
 20 25 30

Leu Leu Lys Ser Ile Asp Arg Asn Gly Ala Leu Glu Gly Ile Gly Lys  
 35 40 45

Pro Glu Lys Leu Lys Ser Asn Leu Thr Gly Tyr Tyr Ser Arg Arg Ile  
 50 55 60

Asn His Glu His Arg Leu Val Tyr Thr Val Asp Asp Asn His Ile Lys  
 65 70 75 80

Ile Ala Ser Cys Lys Tyr His Tyr  
 85

<210> 108  
 <211> 84  
 <212> PRT  
 <213> *Streptococcus pneumoniae*

<400> 108

Met Glu Ala Val Leu Tyr Ser Thr Phe Arg Asn His Leu Lys Asp Tyr  
 1 5 10 15

Met Lys Lys Val Asn Asp Glu Phe Glu Pro Leu Thr Val Val Asn Lys  
 20 25 30

Asn Pro Asp Glu Asp Ile Val Val Leu Ser Lys Ser Glu Trp Asp Ser  
 35 40 45

Ile Gln Glu Thr Leu Arg Ile Ala Gln Asn Lys Glu Leu Ser Asp Lys  
 50 55 60

Val Leu Arg Gly Met Ala Gln Val Arg Ala Gly Ser Thr Gln Val His  
 65 70 75 80

Val Ile Glu Glu

<210> 109

&lt;211&gt; 84

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 109

Met	Leu	Leu	Lys	Phe	Thr	Glu	Asp	Ala	Trp	Ala	Asp	Tyr	Cys	Tyr	Trp
1				5				10					15		

Gln	Asn	Gln	Asp	Lys	Lys	Thr	Leu	Lys	Arg	Ile	Asn	Lys	Leu	Ile	Lys
				20				25				30			

Asp	Ile	Gln	Arg	Asp	Pro	Phe	Thr	Gly	Ile	Gly	Lys	Pro	Glu	Pro	Leu
	35				40						45				

Lys	Tyr	Asp	Tyr	Gln	Gly	Ala	Trp	Ser	Arg	Arg	Ile	Asp	Ala	Glu	Asn
	50				55				60						

Arg	Leu	Ile	Tyr	Met	Met	Asp	Gly	Asp	Ser	Val	Ala	Phe	Leu	Ser	Phe
65				70					75			80			

Lys Asp His Tyr

&lt;210&gt; 110

&lt;211&gt; 87

&lt;212&gt; PRT

&lt;213&gt; Streptomyces coelicolor

&lt;400&gt; 110

Met	Ser	Ile	Thr	Ala	Ser	Glu	Ala	Arg	Gln	Asn	Leu	Phe	Pro	Leu	Ile
1				5				10					15		

Glu	Gln	Val	Asn	Glu	Asp	His	Ala	Pro	Val	His	Ile	Thr	Ser	Arg	Lys
		20				25					30				

Gly	Asn	Ala	Val	Leu	Met	Ser	Glu	Glu	Asp	Phe	Thr	Ala	Trp	Thr	Glu
	35				40						45				

Thr	Val	His	Leu	Leu	Arg	Ser	Pro	Arg	Asn	Ala	Arg	Arg	Leu	Leu	Asp
50				55					60						

Ser	Ile	Ala	Glu	Ala	Glu	Ala	Gly	Asp	Ala	Thr	Glu	His	Asp	Leu	Ile
65				70					75			80			

Asp	Pro	Asp	Ala	Glu	Arg	Ala									
			85												

&lt;210&gt; 111

&lt;211&gt; 84

&lt;212&gt; PRT

&lt;213&gt; Streptomyces coelicolor

&lt;400&gt; 111

Met	Arg	Ile	Thr	Phe	Thr	Ser	His	Gly	Trp	Glu	Asp	Tyr	Val	His	Trp
1				5				10				15			

Ala	Glu	Ser	Asp	Arg	Lys	Val	Thr	Lys	Arg	Ile	Asn	Arg	Leu	Ile	Ala
		20			25					30					

Asp	Ile	Ala	Arg	Asp	Pro	Phe	Lys	Gly	Val	Gly	Lys	Pro	Glu	Pro	Leu
	35				40						45				

Lys Gly Asp Leu Ser Gly Tyr Trp Ser Arg Arg Ile Asp Asp Thr His  
 50 55 60

Arg Leu Val Tyr Lys Pro Thr Asp Asp Gln Leu Val Ile Val Gln Ala  
 65 70 75 80

Arg Tyr His Tyr

<210> 112

<211> 93

<212> PRT

<213> Streptomyces viridochromogenes

<400> 112

Met Ser Ile Asn Arg Glu Arg Ser Arg Lys Ala Leu Phe Pro Leu Ile  
 1 5 10 15

Lys Lys Val Asn Asp Asn His Glu Ala Ile Glu Ile Val Ser Lys His  
 20 25 30

Gly Asn Ala Val Leu Val Ser Ala Glu Asp Tyr Ala Ala Leu Arg Glu  
 35 40 45

Gly Ser Tyr Leu Leu Arg Ser Pro Ala Asn Ala Arg Arg Leu Leu Lys  
 50 55 60

Ala Tyr Glu Asn Ala Leu Ala His Val Asn Val Ser Glu Arg Glu Leu  
 65 70 75 80

Ile Asp Pro Asp Ser Ala Asp Ala Gly Ser Gly Ala Ala  
 85 90

<210> 113

<211> 84

<212> PRT

<213> Streptomyces viridochromogenes

<400> 113

Met Arg Leu Val Phe Glu Asp Gln Gly Trp Asp Asp Tyr Thr Ser Trp  
 1 5 10 15

Leu Lys Asn Asp Arg Lys Met Leu Ala Arg Ile Asn Lys Leu Ile Glu  
 20 25 30

Asp Val Arg Arg Asp Pro Phe Thr Gly Ile Gly Lys Pro Glu Pro Leu  
 35 40 45

Lys Tyr His Leu Pro Gly Ala Trp Ser Arg Arg Ile Asp Asp Glu His  
 50 55 60

Arg Leu Val Tyr Leu Val Thr Asp Lys Glu Ile Val Ile Leu Ala Ala  
 65 70 75 80

Arg Tyr His Tyr

<210> 114

<211> 100

<212> PRT

<213> Synechocystis sp. PCC 7942

<400> 114

Met Ala Lys Cys Tyr Cys Cys Thr Thr Ser Cys Thr Thr Pro Arg Leu  
 1 5 10 15

Met Lys Val Val Ser Phe Ser Asp Ala Arg Lys Asn Leu Lys Thr Val  
 20 25 30

Leu Asp Glu Val Val Asn Asp Ala Asp Tyr Thr Ile Ile Thr Arg Arg  
 35 40 45

Asn Ala Glu Glu Val Val Met Ser Leu Asp Ser Phe Asn Ser Leu  
 50 55 60

Ile Glu Thr Phe His Leu Leu Lys Ser Pro Ala Asn Ala Ala His Leu  
 65 70 75 80

Gln Arg Ser Ile Ala Gln Tyr Gln Gln Gly Gln Thr Val Glu Arg Asn  
 85 90 95

Leu Leu Asp Ala  
 100

<210> 115

<211> 87

<212> PRT

<213> Synechocystis sp. PCC 7942

<400> 115

Met Arg Lys Leu Ala Trp Thr Asn Glu Ala Trp Glu Asp Tyr Leu Tyr  
 1 5 10 15

Trp Gln Gly Gln Asp Lys Lys Thr Leu Asn Arg Ile Asn Lys Leu Ile  
 20 25 30

Thr Glu Thr Leu Arg Ser Pro Phe Glu Gly Ile Gly Lys Pro Glu Ala  
 35 40 45

Leu Arg Glu Asn Leu Thr Gly Phe Trp Ser Arg Arg Ile Asp Asp Thr  
 50 55 60

Asn Arg Leu Val Tyr Ala Val Ala Asp Asp Tyr Leu Thr Ile Ile Ser  
 65 70 75 80

Cys Arg Tyr His Tyr Ser Asp  
 85

<210> 116

<211> 87

<212> PRT

<213> Synechocystis sp. PCC 6803 A

<400> 116

Met Lys Ala Ile Thr Thr Gln Ala Lys Asp His Leu Asp Glu Leu  
 1 5 10 15

Ile Asn Ala Val Ile Ser Asp Leu Glu Pro Thr Ile Val Ser Asn Asn  
 20 25 30

Gln Gly Gln Gln Ala Val Leu Ile Ser Leu Asp Glu Phe Asn Ser Trp  
 35 40 45

Gln Glu Thr Leu Tyr Leu Leu Ser Asn Pro Thr Asn Ala Glu His Leu

50 55 60

Met Ala Ser Ile Lys Gln Ala Glu Thr Gly Gln Ile Ile Lys Gln Lys  
 65 70 75 80

Leu Pro Asp Leu Leu Glu Leu  
 85

<210> 117  
 <211> 86  
 <212> PRT  
 <213> Synechocystis sp. PCC 6803 A  
 <400> 117

Met Lys Ile Ala Phe Thr Glu Leu Ser Trp His Asp Tyr Leu Trp Phe  
 1 5 10 15

Gln Gln Asn Asp Lys Lys Leu Leu Lys Arg Ile Asn Leu Leu Ile Lys  
 20 25 30

Ala Ile Ala Arg Asp Pro Phe Asp Gly Ile Gly Lys Pro Glu Pro Leu  
 35 40 45

Lys Ala Asn Leu Ser Gly Tyr Trp Ser Arg Arg Ile Asn Ser Glu His  
 50 55 60

Arg Leu Val Tyr Thr Ile Ala Asp Arg Asp Leu Leu Ile Ile Ser Cys  
 65 70 75 80

Arg Phe His Tyr Gln Arg  
 85

<210> 118  
 <211> 87  
 <212> PRT  
 <213> Synechocystis sp. PCC 6803 B  
 <400> 118

Met Glu Thr Ile Asn Tyr Gln Gln Phe Ser Glu Lys Leu Pro Thr Leu  
 1 5 10 15

Val Glu Lys Ile Gly Asn Glu Gln Glu Pro Leu Cys Leu Glu Leu Pro  
 20 25 30

Asn Tyr Leu Arg Ala Val Ile Ile Ser Glu Gln Asp Tyr Arg Ser Leu  
 35 40 45

Met Glu Thr Val Tyr Leu Leu Ser Asn Pro Val Asn Ala Glu Lys Leu  
 50 55 60

Leu Thr Thr Ala Ser Arg Ser Ile Asp Gln Ala Thr Ser Trp Thr Lys  
 65 70 75 80

Val Lys Asn Asp Leu Gly Leu  
 85

<210> 119  
 <211> 86  
 <212> PRT  
 <213> Synechocystis sp. PCC 6803 B  
 <400> 119

Met Lys Glu Val Val Leu Asp Ser Gln Ala Ile Glu Asp Ile Lys Trp  
 1 5 10 15

Trp Ile Gln Gln Asp Lys Lys Leu Ala Leu Lys Ile Met Glu Leu Ile  
 20 25 30

Glu Thr Leu Pro Lys Ser Pro Phe Ala Gly Lys Gly Lys Pro Glu Lys  
 35 40 45

Leu Arg Phe Asn Leu Ser Gly Phe Trp Pro Arg Arg Ile Thr Gln Glu  
 50 55 60

His Arg Leu Val Tyr Glu Val Thr Asp Asp Phe Ile Arg Val Val Ser  
 65 70 75 80

Cys Arg Tyr His Tyr Arg  
 85

<210> 120  
 <211> 80  
 <212> PRT  
 <213> *Tiobacillus ferroxidant*

<400> 120

Met Ser Thr Leu Thr Ala Ser Glu Ala Arg Ala Asn Leu Tyr Arg Leu  
 1 5 10 15

Ile Asp Gln Ala Ala Glu Ser His Gln Pro Ile Tyr Ile Ala Gly Lys  
 20 25 30

Arg Thr Ser Ala Val Leu Leu Ser Thr Glu Asp Trp Glu Ala Ile Gln  
 35 40 45

Glu Thr Leu Tyr Leu Leu Ser Val Pro Gly Met Arg Glu Ser Ile Lys  
 50 55 60

Glu Gly Met Ala Glu Pro Leu Ser Lys Ser Asn Met Asp Leu Lys Trp  
 65 70 75 80

<210> 121  
 <211> 83  
 <212> PRT  
 <213> *Tiobacillus ferroxidant*

<400> 121

Met Val Tyr Ser Lys His Ala Gln Lys Asp Ala Lys Lys Leu Ala Ala  
 1 5 10 15

Ala Gly Leu Lys Asn Asn Ala Ile Glu Leu Leu Ala Val Leu Ala Ala  
 20 25 30

Asp Pro Phe Gln Asn Pro Pro Tyr Glu Asn Leu Val Gly Asp Leu  
 35 40 45

Ala Gly Ala Tyr Ser Arg Arg Ile Asn Ile Gln His Arg Leu Val Tyr  
 50 55 60

Glu Val Phe Pro Lys Glu Arg Val Val Arg Val Leu Arg Met Trp Thr  
 65 70 75 80

His Tyr Glu

<210> 122  
 <211> 83  
 <212> PRT  
 <213> *Yersinia enterocolitica*  
 <400> 122

Met Arg Thr Ile Ser Tyr Ser Glu Ala Arg Gln Asn Leu Ser Thr Thr  
 1 5 10 15

Met Val Gln Thr Val Glu Asp Arg Ala Pro Ile Leu Ile Thr Arg Gln  
 20 25 30

Asn Gly Thr Ser Cys Val Leu Met Ser Leu Glu Glu Tyr Glu Ser Leu  
 35 40 45

Glu Glu Thr Ala Tyr Leu Leu Arg Ser Pro Ala Asn Ala Lys His Leu  
 50 55 60

Met Asp Ser Ile Glu Glu Leu Arg Ala Gly Lys Gly Ile Gln Arg Glu  
 65 70 75 80

Leu Glu Ala

<210> 123  
 <211> 84  
 <212> PRT  
 <213> *Yersinia enterocolitica*  
 <400> 123

Met Lys Ile Ile Phe Ser Ser Cys Ser Trp Glu Asp Tyr Leu Tyr Trp  
 1 5 10 15

Gln Gln Thr Asp Lys Lys Ile Leu Lys Arg Ile Asn Gly Leu Val Lys  
 20 25 30

Asn Ile Gln Arg Thr Pro Phe Glu Val Lys Gly Lys Pro Glu Pro Leu  
 35 40 45

Lys His Asn Leu Ala Gly Phe Trp Ser Arg Arg Met Thr Glu Glu His  
 50 55 60

Arg Leu Val Tyr Glu Val Ser Gly Asp Asn Leu Leu Ile Ala Ala Tyr  
 65 70 75 80

Arg Tyr Tyr Tyr

<210> 124  
 <211> 69  
 <212> PRT  
 <213> *Yersinia enterocolitica*  
 <400> 124

Met Asn Ser Ile Ser Tyr Thr Ala Ala Arg Asn Asn Leu Ala Lys Val  
 1 5 10 15

Leu Leu Glu Ala Gln Lys Gln Pro Val Glu Ile Thr Arg Arg Gly Gln  
 20 25 30

Ser Glu Val Tyr Ile Ile Ser Lys Ala Asp Tyr Glu Asp Leu Met Lys

35

40

45

Ala Lys Val Lys Ala His Ile Gln Phe Lys His Ala Glu Thr Ile Lys  
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Ala Leu Ala Asp Arg  
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Met Ile Phe Leu Thr Ala Asn Asp Ile Ala Glu Phe Asn Ala Glu Ile  
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Ile Pro Asn Gly Arg Pro Asp Asn Ser Lys Ile Glu Ala Val Ala Ser  
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Arg Val Leu Asn Ala His His Tyr Asp Asn Val Asp Asp Val Tyr Gln  
 35 40 45

Leu Ala Ala Ile Tyr Leu Ile Ala Ile Ser Arg Gly His Ile Phe Leu  
 50 55 60

Asp Gly Asn Lys Arg Thr Ala Phe Gln Ser Met Ala Leu Phe Leu Gly  
 65 70 75 80

Ile Asn Gly Val Asp Leu Cys Ala Ser Asn Gln Leu Glu Glu Leu Thr  
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Val Glu Ala Ala Gln Gly Lys Ile Gly Val Glu Gln Ile Thr Glu Gln  
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Leu Arg Glu Leu Thr Glu  
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Arg Thr Ile Ser Tyr Ser Glu Ala Arg Gln Asn Leu Ser Ala Thr Met  
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Met

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Met Asp Ser Ile Asp Ser Leu Lys Ser Gly Lys Gly Thr Glu Lys Asp  
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<223> Single strand DNA oligonucleotide

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